Perspective

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Factsheet

# System 4: Waterless System with Urine Diversion

العربية (/ar/sanitation-systems/sanitation-systems/system-4:-waterless-system-with-urine-diversion)

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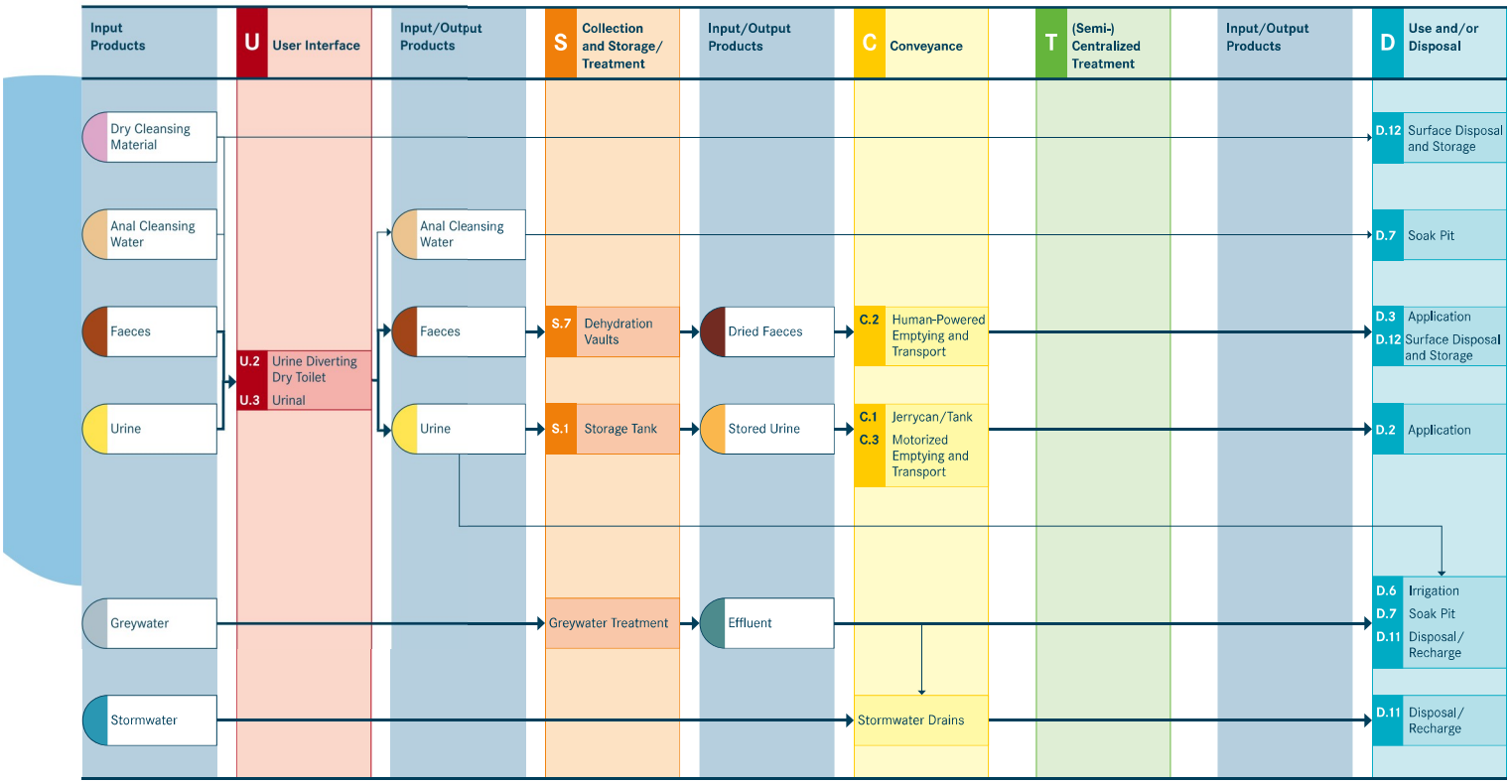
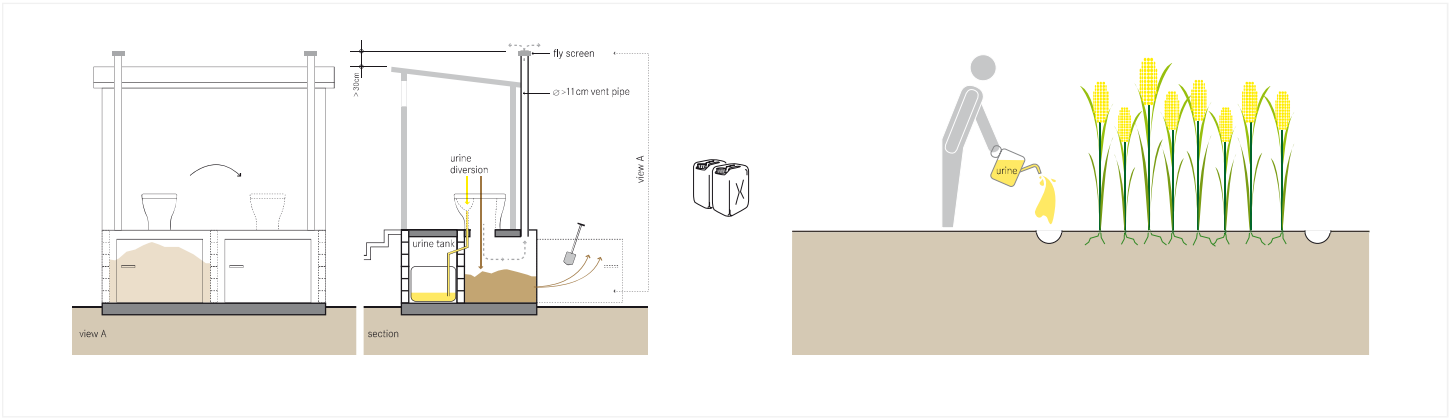
## Adapted from

**Compendium of Sanitation Systems and Technologies. 2nd Revised Edition (/node/5587)**






This system is designed to separate Urine and Faeces to allow the Faeces to dehydrate and/or recover the Urine for beneficial use. Inputs to the system can include Faeces, Urine, Anal Cleansing Water and Dry Cleansing Materials.

The main **User Interface (/sanitation-technologies#group-u)** technology for this system is the **Urine-Diverting Dry Toilet (UDDT) (/sanitation-systems/sanitation-technologies/urine-diverting-dry-toilet-(uddt))**, which allows Urine and Faeces to be separately collected. A **Urinal (/sanitation-systems/sanitation-technologies/urinal)** can additionally be installed for the effective collection of Urine. Different **Urine-Diverting Dry Toilet (UDDT) (/sanitation-systems/sanitation-technologies/urine-diverting-dry-toilet-(uddt))** designs exist for different preferences (e.g., models with a third diversion for Anal Cleansing Water).

**Dehydration Vaults (/sanitation-systems/sanitation-technologies/dehydration-vaults)** are used for the **Collection and Storage/Treatment (/sanitation-technologies#group-s)** of Faeces. When storing the Faeces in vaults, they should be kept as dry as possible to encourage dehydration and hygienization. Therefore, the chambers should be watertight and care should be taken to ensure that no water is introduced. Anal Cleansing Water should never be put into **Dehydration Vaults (/sanitation-systems/sanitation-technologies/dehydration-vaults)**, but it can be diverted and discharged into a **Soak Pit (/sanitation-systems/sanitation-technologies/soak-pit)**. Also important is a constant supply of ash, lime, soil, or sawdust to cover the Faeces. This helps to absorb humidity, minimize odours and provide a barrier between the Faeces and potential vectors (flies). If ash or lime are used, the related pH increase will also help to kill pathogenic organisms.

For the **Collection and Storage/Treatment of Urine (/sanitation-technologies#group-s)**, **Urine Storage Tank / Container (/sanitation-systems/sanitation-technologies/urine-storage-tank-/-container)** are used. Alternatively, Urine can also be diverted directly to the ground through an **Irrigation (/sanitation-systems/sanitation-technologies/irrigation)** or infiltrated through a **Soak Pit (/sanitation-systems/sanitation-technologies/soak-pit)**.

Stored Urine can be easily handled and poses little risk because it is nearly sterile. With its high nutrient content it can be used as a good liquid fertilizer. Stored Urine can be transported for

Application in agriculture (**Application of Stored Urine (/sanitation-systems/sanitation-technologies/application-of-stored-urine)**) using either **Jerrycan / Tank (/node/7932)**, or a **Motorised Emptying and Transport (/sanitation-systems/sanitation-technologies/motorised-emptying-and-transport)** – the same way that bulk water or Sludge is transported to fields.

**Human-powered Emptying and Transport (/sanitation-systems/sanitation-technologies/human-powered-emptying-and-transport)** is required for the removal and Conveyance of the Dried Faeces generated from the **Dehydration Vaults (/sanitation-systems/sanitation-technologies/dehydration-vaults)**. The alternating use of double Dehydration Vaults allows for an extended dehydration period so that the Dried Faeces pose little human health risk when they are removed. A minimum storage time of 6 months is recommended when ash or lime are used as cover material. The Dried Faeces can then be applied as soil conditioner (**Application of Dehydrated Faeces (/sanitation-systems/sanitation-technologies/application-of-dehydrated-faeces)**). If there are concerns about the quality of the material, it can be further composted in a dedicated composting facility before it is used. If there is no use for the product, it can be temporarily stored or permanently disposed of (**Surface Disposal and Storage (/sanitation-systems/sanitation-technologies/surface-disposal-and-storage)**).

## Considerations

This system can be used anywhere, but is especially appropriate for rocky areas where digging is difficult, where there is a high groundwater table, or in water-scarce regions. The success of this system depends on the efficient separation of Urine and Faeces, as well as the use of a suitable cover material. A dry, hot climate can also considerably contribute to the rapid dehydration of the Faeces.

The material that is removed should be in a safe, useable form, although proper personal protection should be used during removal, transport and use.

A separate Greywater system is required since it should not be introduced into the **Dehydration Vaults (/sanitation-systems/sanitation-technologies/dehydration-vaults)**.

If there is no agricultural need and/or no acceptance of using the urine, it can be directly infiltrated into the soil or into a **Soak Pit (/sanitation-systems/sanitation-technologies/soak-pit)**. Where there are no suppliers of prefabricated **Urine-Diverting Dry Toilet (UDDT) (/sanitation-systems/sanitation-technologies/urine-diverting-dry-toilet-(uddt))** pedestals or slabs, they can be locally manufactured using available materials.

All types of Dry Cleansing Materials can be used, although it is best to separately collect them as they will not decompose in the vaults and use up space. Anal Cleansing Water must be separated from the Faeces, but it can be mixed with the Urine if it is transferred to a **Soak Pit (/sanitation-systems**

**/sanitation-technologies/soak-pit)**. If Urine is used in agriculture, Anal Cleansing Water should be kept separate and infiltrated locally or treated along with Greywater.

**Guidelines for the Safe Use of Urine and Faeces in Ecological Sanitation Systems (/node/107)** have been published by the World Health Organization (WHO) and are referenced on the relevant technology information sheets.

## Library References

### Compendium of Sanitation Systems and Technologies. 2nd Revised Edition

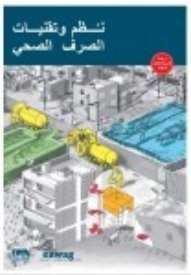
This compendium gives a systematic overview on different sanitation systems and technologies and describes a wide range of available low-cost sanitation technologies.

TILLEY, E. ULRICH, L. LUETHI, C. REYMOND, P. ZURBRUEGG, C. (2014): Compendium of Sanitation Systems and Technologies. 2nd Revised Edition. Duebendorf, Switzerland: Swiss Federal Institute of Aquatic Science and Technology (Eawag) **URL (http://www.eawag.ch/forschung/sandec/publikationen/compendium_e/index_EN)** [Accessed: 28.07.2014] **PDF (/sites/default/files/reference_attachments/TILLEY%20et%20al%202014%20Compendium%20of%20Sanitation%20Systems%20and%20Tech**

**(/sites/default/files/reference_attachments/TILLEY%20et%20al%202014%20Compendium%20of%20Sanitation%20Systems.pdf)**

## Further Readings

### Compendium of Sanitation Systems and Technologies (Arabic)




This is the Arabic version of the Compendium of Sanitation Systems and Technologies. The Compendium gives a systematic overview on different sanitation systems and technologies and describes a wide range of available low-cost sanitation technologies.

TILLEY, E. ULRICH, L. LUETHI, C. REYMOND, P. SCHERTENLEIB, R. ZURBRUEGG, C. (2014): Compendium of Sanitation Systems and Technologies (Arabic). 2nd Revised Edition. Duebendorf, Switzerland: Swiss Federal Institute of Aquatic Science and Technology (Eawag) **PDF (/sites/default/files/reference_attachments/TILLEY%20et%20al%202014%20Arabic%20Compendium%20of%20Sanitation%20Systems.pdf)**

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